UPPER TIBIAL OSTEOTOMIES AS TREATMENT OF SECONDARY VARUM KNEE ARTHRITIS

Abstract of PhD Thesis

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-2007-
The choice of researching this subject under the form of a comprehensive PhD dissertation has represented my main preoccupation for several years and it has become a major necessity in the orthopedics of the last years together with the advent of new methods for knee arthritis therapy, either less invasive arthroscopic or more invasive therapies, such as the new implants for the knee arthroplasty. Is the technique of superior tibial osteotomy that appeared 50 years ago still valid? Is it still recommended? What are the biomechanical breakthroughs that appeared in the knee arthritis physiopathology? These represented several research questions that I have tried to answer in the present dissertation and for which I hope to have found the most relevant answers.

The thesis comprises two main parts, a general theoretical part and a special, applied one. The general part deals with modern aspects of biomechanics, physiopathology and pathologic anatomy as well as the therapy of secondary varus knee arthritis. The second part of the thesis includes four chapters: the first chapter focuses on tibial osteotomy, its biomechanical bases and two clinical trials; chapter two is an experimental study; chapter three entitled Discussion, surveys the technical variants of tibial osteotomies worldwide, with their specific advantages and disadvantages. Chapter four is dedicated to final conclusions of the present research and bibliography.

Chapter I of the thesis presents current views on biomechanics, physiopathology, patologic anatomy and therapy of secondary varus knee arthritis.

The subchapter of anatomy surveys portal structures for fixation, sliding and those involved in the active motions of the knee. A subchapter of biomechanics details successively aspects of femorotibial and patellofemoral joints as well as elements of knee lubrication.

A brief presentation of knee arthritis pathogenesis precedes an extensive chapter on gonarthrosis physiopathology which deals with the relation between degeneration of joint cartilage and arthrosis, stages of arthrosis, the link between joint wear and degeneration of joint cartilage as well as the stages of repair and regeneration of joint cartilage, all of which have an impact in the therapy of secondary genu varum knee arthritis. In the end, aspects of pathologic, macroscopic and microscopic anatomy are presented.

The subchapter presenting methods of diagnosis in knee arthritis and knee arthritis staging includes a survey of clinical aspects followed by a detailed presentation of femur-tibial alignment, which are essential for radiological evaluation of knee arthritis and preoperative planning of osteotomies.

Part I ends with a subchapter dedicated to therapeutic methods in knee arthritis, stress being laid on modern, minimally invasive methods and on osteotomy, respectively.

Part II begins with a subchapter on biomechanical bases of knee arthritis, i.e. the role of varus distance and adductor moment in knee arthritis evolution and postoperative prognosis of patients with osteotomy.

The following 3 subchapters present three clinical trials based on the two variants of superior tibial osteotomies studied in the current thesis, i.e. closing- and opening-wedge osteotomy, the last trial presenting the life standard follow-up of patients with osteotomy.

Closing osteotomy represents the first technique employed worldwide, introduced by Jackson and Waugh in the 60’s and disseminated by Covertry. Until the beginning of the 80’s this represented the technique employed by most authors, the majority of studies...
concentrating on this method. For a definite period the closing osteotomy also represented the elective method in our clinic, and therefore the data enabled the realization of consistent research. The results of this clinical trial are good and they permit refinement of indications of this technical variant within the current context of research and development.

The second clinical trial concentrates on the technique of opening osteotomy, which has been adopted nowadays by the majority of authors. The technique was implemented by Hernigou (the first long-term trials were attributed to him) as a reversed variant of the former technique, i.e. addition of a bone edge at the medial tibial face versus removal of a bone edge in the former technique in order to perform the necessary correction. This rather new technique has, nevertheless, allowed through the amount of operated cases, performance of a short-term trial whose results are presented in a subchapter of the current thesis. The technique is easier to perform, more precise, and will therefore represent the therapy of choice for a certain category of patients, its indications being already established.

The last subchapter considers a third clinical trial focusing on the living standard follow-up of patients after tibial osteotomy. A knee score was used and adapted so as to be easily understood by all categories of patients and self-addressed questionnaires were mailed. Classification of the living standard of patients with osteotomy was evaluated according to their answers: most patients reported very good and good results consistent with the data in the literature.

Chapter III is an experimental study. The hypothesis was based on the research question if experimentally generated vicious alignment can lead to arthrosis on animal models, and if so, what is the time span? Unlike in other studies, the selected animal models were the hens as they are biped and therefore, the results can be more easily extended to humans. The results were surprising, pre-arthrosis and arthrosis modifications having an early onset, which demonstrates the relatively low cartilage capacity to resist static biped modifications. Evidence of histological tests obtained after the animals were sacrificed and classification according to Mankin histological scale, support our results.

Chapter IV focuses on Discussions. All stage details in any osteotomy are presented and practical aspects underlined. We have dealt at large with preoperative planning, stressing correction aspects that are technique and weight-bound. Types of osteotomy performed worldwide are surveyed: curved osteotomy, opening and closing osteotomy. We analyzed their advantages and disadvantages, technique idiosyncrasies as well as osteotomy-bound gestures; the results, predictive factors, complications, the choice of osteotomy type and osteosynthesis method are presented at the end of this chapter.

The Final Conclusions emphasize the central ideas of the thesis. Indications and advantages of osteotomies versus endoprostheses are presented, as well as the role of the experimental study. We are entitled to conclude that proximal tibial osteotomy holds a well established place in the current therapeutic approaches of knee arthritis.

Tg. Mures, 07.01.2008